SECTION 16118
UNDERGROUND CONDUIT DUCT BANK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Metallic and Non-metallic Underground Conduit Duct banks.
   2. Non-metallic innerduct.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
   2. Section 02222, Excavation for Utilities: Excavation and backfill for conduit and utilities on site.
   3. Section 03300, Cast-In-Place Concrete: Protective envelope for underground conduit installations.
   4. Section 16111, Conduit and Fittings.
   5. Section 16117, Manholes.
   6. Section 16450, Grounding.

1.3 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI C2-97, National Electrical Safety Code.

B. National Fire Protection Association (NFPA):
   1. NFPA 70-99, National Electrical Code (NEC)

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and General and Supplementary Conditions.

B. Products furnished from listed manufacturers are pre-approved but still require submittal.

C. Submit proposed substitutions for approval in accordance with General and Supplemental Conditions.

D. Submit for information as-built drawings indicating accurate routing of underground duct banks.

1.5 QUALITY ASSURANCE

A. NFPA Compliance: Equipment and components shall be designed, fabricated, and installed in compliance with NFPA 70.

B. UL and NEMA Compliance: Provide components required as part of duct banks that are listed and labeled by UL and comply with applicable NEMA standards.

C. Coordination: Coordinate layout and installation of duct banks with underground piping and with other installations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products in a manner to ensure installation of materials in new condition. Protect materials in on-site storage from weather.

B. Accept conduit on-site. Inspect for damage.

C. Protect non-metallic conduit from entrance of debris, and provide appropriate covering to protect from sunlight.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate location of concrete duct banks with other construction activities.

PART 2 - PRODUCTS

2.1 RIGID NON-METALLIC CONDUIT

A. Refer to Specification 16111, Conduit and Fittings, Part 2.

2.2 INNERDUCT

A. Corrugated non-metallic, high density polyethylene (HDPE) innerduct, sizes as shown, for installation in PVC duct. Provide length marked pull rope in each innerduct.

2.3 CAST-IN-PLACE CONCRETE

A. Concrete: Refer to Division 03300.

B. Reinforcement: According to details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify routing and termination locations of conduit duct bank prior to excavation.

B. Verify field measurements.

C. Verify conduit is anchored prior to placing concrete.

3.2 PREPARATION

A. Excavate, trench, and prepare site for underground conduit duct bank installation.

3.3 INSTALLATION

A. Install underground conduit duct bank according to routing and details shown.

B. Where necessary to cut conduit, use saw or pipecutter; and deburr cut ends.

C. Bring conduit to shoulder of fittings; fasten securely.

D. Join non-metallic conduit using cement recommended by manufacturer. Wipe non-metallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 min, minimum.

E. Use suitable non-metallic separators and chairs installed not greater than 4 ft on centers. Band conduit together with suitable banding devices. Anchor conduit to prevent movement during concrete placement.

F. Stagger conduit joints in concrete encasement 6 inches min, vertically.

G. Install conduit with minimum slope of 3 in./100 feet, sloping toward manholes.

H. Depth: Per IEEE C2; top of duct bank 24 inches minimum below finished grade.

I. Terminate conduits with PVC end bells at manhole entries.

J. Use suitable caps to protect installed conduit from entrance of dirt and moisture.

K. Install innerduct with cables in a single duct at the same time in the same pull.

L. Install reinforcing bars as shown in details, duct banks are "regular construction" (requiring no reinforcing) unless otherwise noted. Note reinforcing requirements as "regular reinforcing" or "heavy reinforcing."

M. Install regular reinforced type construction for duct banks passing under roadways, and extend reinforcement 10 feet beyond each side of roadbed.

N. Pour concrete into formed bank of conduits.

O. Provide a minimum of 3 inches of concrete cover at bottom, top, and sides of conduit duct bank.

P. Install 4/0 bare copper conductor in concrete at top center of duct bank approximately 1 inch below top surface of concrete.

Q. Uniformly dust red iron oxide over top of freshly poured concrete at the rate of 1 lb/yd of surface.

R. Provide rigid steel conduit for all 90 degree bends and for all stub-ups through slabs on grade. Provide threaded adapters, made specifically for the purpose, to convert from rigid steel to PVC conduit.

3.4 FIELD QUALITY CONTROL

A. Verify that installed duct banks drain to manholes.

B. Check that ducts are open and free of debris.

3.5 CLEANING

A. Clean ducts from all debris and leave in condition for cable pulling.

3.6 PROTECTION

A. Provide protective plugs for all ducts at both ends. Secure pull ropes at both ends for cable pulling or future use.

END OF SECTION 16118